

Rock Island Arsenal
Shop B
(Building 60)
Rodman Avenue between Gillespie Avenue
and First Street
Rock Island
Rock Island County
Illinois

HAER No. IL-20-A

HAER
ILL,
81-ROCIL,
3/60

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
Washington, D.C. 20013-7127

HAER
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HISTORIC AMERICAN ENGINEERING RECORD

ROCK ISLAND ARSENAL

SHOP B

(Building 60)

HAER No. IL-20A

Location: Rodman Avenue between Gillespie Avenue and First Street,
Rock Island Arsenal,
Rock Island,
Rock Island County, Illinois
UTM: 15.704720.4599000
Quad: Davenport East

Date of Construction 1866-1872

Present Owner and Occupant: U.S. Army

Present Use: Officers' club, post restaurant, museum, administrative offices

Significance: After taking command of Rock Island Arsenal in 1865, General Thomas Jefferson Rodman devised a master plan for the installation calling for the construction of ten large, Greek Revival, manufacturing shops, five on each side of the island's major east-west thoroughfare. Under construction from 1866 to 1872, Shop B was the first to be completed. With its companion facilities completed under the Rodman plan, Shop B forms a cohesive architectural statement, which, in terms of both scale and style, has no counterpart among government installations in the Midwest.

In addition to their architectural importance, the Rodman shop buildings are the administrative and technological core of Rock Island Arsenal, one of only two "old-line," nineteenth-century arsenals still in operation for munitions production. The buildings are vital for understanding the history of American ordnance development and manufacture from the Spanish American War to the present. Shop B is part of the Rock Island Arsenal National Register Historic District.

Historian: Jeffrey A. Hess, February 1985

Architectural Historian: David Arbogast, February 1985

PART I. HISTORICAL INFORMATION

A. Physical History:

1. Date of erection: According to Colonel Daniel Webster Flagler, who succeeded General Thomas Jefferson Rodman as the arsenal's commandant in 1871, the building site was selected by Rodman in February 1866 (Flagler, p. 118). Construction commenced in October 1866, and the building was completed in December 1871, with the exception of entrance steps and two interior, iron stairways, which were added in 1872 (Flagler, pp. 256, 317). A datestone in the southwest corner of the south elevation bears the inscription, "Begun 1867 Finished 1871."
2. Architect: General Thomas Jefferson Rodman (Flagler, p. 261). Born in Salem, Indiana in 1815, Rodman graduated from West Point in 1841 and was assigned to Allegheny Arsenal in Pittsburgh as an officer of the Ordnance Department. During the next two decades, he developed techniques for hollow casting cannon and for producing perforated propellant, which revolutionized the manufacture and use of artillery (Zabecki, pp. 55-56; Flagler, pp. 262-266).

As commandant of Watertown Arsenal near Boston from 1859 to 1865, Rodman was responsible for designing a machine shop for the installation, which was a simplified, brick version of the Greek Revival stone manufacturing shops he subsequently planned for Rock Island Arsenal (Baylies and Bahr, p. 37). Rodman assumed command of Rock Island Arsenal in 1865; he died of illness at the installation in June 1871 (Flagler, pp. 116, 261).

3. Original and subsequent owners: U.S. Army.
4. Builder, contractor, suppliers:

"The stone was furnished by Messrs. Sanger & Steel, of Joliet, Ill., from their limestone quarries on the Illinois and Michigan Canal, about two miles north of Joliet. The price paid was \$6 per cubic yard, delivered at the quarries and measured in the walls of the [building], excluding all openings and builder's or constructive measurements. The cost of transportation to the arsenal was about \$5.50 per yard" (Flagler, p. 256).

"Messrs. Cooper & Hewitt, of New York, furnished the 15 inch I beams (stringers) for the first and second floors, and all the 12 inch I beams (joists) for the second floors. Date of contract, April 21, 1868" (Flagler, p. 256).

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"The Union Iron Mills, of Pittsburgh, Pa., furnished all 12 inch I beams (joists) required for the first floors. Date of contract, May 8, 1868" (Flagler, p. 256).

"The Phoenix Iron Company, of Philadelphia, furnished all the 12 inch I beams (stringers) and all the 9 inch I beams (joists) required for the third floors [,] all the wrought iron columns and cast iron column caps and bases . . . , and the wrought iron roof frames, [which were] manufactured ready to be put up. Date of contract, May 20, 1868" (Flagler, p. 257).

"The cement . . . was furnished by Messrs. James Clark & Sons, of Utica, Ill., at \$1.55 per barrel of 300 pounds delivered at the arsenal. The lime was purchased from W. B. Barnes, of Rock Island, Ill., at 90 cents per barrel of 200 pounds delivered at the arsenal" (Flagler, p. 257).

"The oak flooring was furnished by Messrs. French & Davies, of Davenport, Iowa, at \$41.50 per M, and the pine lumber by Mr. J. S. Keator, of Moline, Ill., at prices varying from \$17 to \$22 per M" (Flagler, p. 257).

"The copper work was furnished and put on by Mr. F. Hass, of Rock Island, Ill., and cost about \$13,000" (Flagler, p. 257).

"The glass used was manufactured by Knox, Kine & Co., of Pittsburgh, Pa., and was furnished by Messrs. H. Dart's Sons, of Rock Island, Ill." (Flagler, p. 257).

"The fire proof brick arches were put in by Messrs. Atkinson & Murdock, of Rock Island, Ill., at \$15.50 per M, (builder's measurement)" (Flagler, p. 257).

Slate roofing was put on by Charles C. Hipwell, a foreman of Aiken & Co. of Pittsburgh, for \$15.25 per square (Flagler, p. 257).

All other construction work was "done by day workmen, employed and paid by the Government. The work was directed and superintended directly by officers of the Ordnance Department stationed at the arsenal, and the necessary engineering work, calculations, making of tests, experiments, etc., was also done by the officers" (Flagler, p. 260).

5. Original plans and construction: On February 7, 1866, Rodman submitted to the War Department a schematic site plan of the arsenal, proposing the construction of ten manufacturing shops, five on each side of the arsenal's main east-west thoroughfare

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(later named Rodman Avenue). The plan was published in 1877 (Flagler, Plate 1). It delineates the ten buildings, including Shop B, as U-shaped structures with a crossbar connecting the legs of the "U" at midpoint. According to Flagler, the configuration of the buildings was almost immediately changed. "To add strength to the walls [and] beauty to the architecture," two porticos were added to the front and to each of the sides of the buildings. Also, the crossbar between the legs of the "U" was removed "to leave the courtyard clear for teaming purposes" (Flagler, p. 123). The revised plan was published in 1877 (Flagler, Figure 1, inset on Plate 1). The picture collection of the Rock Island Arsenal Historical Office contains a photograph, taken about 1870, that shows the building in the final stages of construction, lacking sash, doors, and entrance steps (see HAER Photo No. IL-20A-6). The completed construction is documented by a photograph, ca. 1910, in the picture collection of the Rock Island Arsenal Historical Office (see HAER Photo No. IL-20A-7).

The building's present configuration conforms to the original the construction with two important exceptions. First, a one-story, concrete-block structure (Building 107) now infills the entire courtyard on the north facade, abutting the original stonework. Second, a three-story, stone-veneer building of identical Greek Revival architecture (Building 61, see HAER No. IL-20Q) connects the pavilions on Shop B's east facade to Shop D.

6. Alterations and additions: At undetermined dates, the original slate roofing was removed; metal roofing was installed; and the original stone entrance steps were replaced with concrete steps.

In 1917-1918, the facades of the pavilions on the building's east elevation were demolished. The original stonework from the demolished sections was reused in constructing a three-story, stone-veneered, Greek Revival structure connecting the remaining portions of the pavilions to Shop D. The new building, designated as "B-D Connection," was designed and built by Stone and Webster Company of Boston; it was completed in May 1918 (Completion Report, p. 3; see HAER No. IL-20Q).

In 1943, a one-story, concrete-block structure was constructed in the rear of Shop B, abutting the original stonework and completely infilling the courtyard. Designed as a kitchen, the new building was designated as "Building 107" ("Real Property Inventory," p. 6). In 1944, much of the first floor of Shop B was remodeled into a post cafeteria and officers' club (Nothstein and Stephens, p. 381). After World War II the west wing of the first floor was converted into an ordnance museum (Stephens, p. 690).

In 1981, the original limestone cornice and eaves were replaced with a fiberglass material painted tan to simulate the original stonework. This alteration is documented by a photograph in the picture collection of the Rock Island Arsenal Historical Office, captioned on the back, "Bldg. 60, looking N., cornice repair, 20 Feb. 81."

B. Historical Context:

After assuming command of Rock Island Arsenal in August 1865, General Thomas Jefferson Rodman devised a master construction plan for the installation, which he submitted to the War Department on February 7, 1866. In its general outline, Rodman's plan called for the construction of ten large, stone, manufacturing shops, five on each side of the arsenal's main east-west thoroughfare (later named Rodman Avenue). The establishments on the south side of the avenue were called "arsenal shops," which meant they were to be devoted to the manufacture of general ordnance items. Those on the north side were called "armory shops," because they were intended for small arms production. All ten shops were designed in a Greek Revival style, which Rodman had previously used in designing a machine shop at Watertown Arsenal near Boston. Although none of the shops was completed before Rodman died of illness in June 1871, all ten were eventually finished by his nineteenth-century successors (Flagler, p. 118; Nothstein and Stephens, pp. 153-157).

Situated on the western end of "armory row," Shop B was the first shop under construction and the first completed. Excavation began in October 1866, and construction concluded in 1872. Although Shop B was intended for the manufacture of small arms, Congress did not appropriate funds for the necessary machinery until the end of the nineteenth century. During this period, Shop B served as a general purpose storehouse (Nothstein and Stephens, p. 209). From 1872 to 1889, the building also was the post headquarters (Slattery, n.p.).

In 1899, Congress finally authorized the purchase of small arms manufacturing equipment for Rock Island Arsenal. During the next three years, the three westernmost shops on armory row were equipped to produce 1903 model Springfield rifles (Nothstein and Stephens, pp. 209-210). Shop B was outfitted as a machine shop for a number of rifle components, including barrels, bolts, receivers, and trigger guards. Machining operations took place on the first (see HAER Photo No. IL-20A-8) and second floors, while the basement contained gas-fired furnaces and oil tanks for hardening and tempering parts manufactured on the levels above (Stanley, IV, pp. 241-242; V, pp. 286-288; VI, p. 311). The machinery was powered by the arsenal's hydroelectric plant, which was completed in 1901 (see HAER No. IL-20CC).

Small arms production commenced in 1904 and continued until 1913; it resumed in 1916 and terminated again in 1919 (Nothstein and Stephens, pp. 215-218, 232). The machining operations followed well established procedures, which, in some cases, were at least thirty years old (see "Supplemental Material" section of this report). After 1919, Shop B was used for repairing and reconditioning rifles (Nothstein and Stephens, pp. 341-349). Following the outbreak of World War II, Shop B was cleared of small arms production machinery and converted into an overhaul shop for tank engines and miscellaneous automotive equipment (Nothstein and Stephens, p. 396). In 1944, most of the building's manufacturing operations were suspended, and the east wing of the first floor was remodeled into a post cafeteria and officers' club. After World War II, the west wing of the first floor was occupied by the Rock Island Museum, which, in 1959, was renamed the John M. Browning Memorial Museum, "to honor . . . the father of modern automatic weapons in the United States" ("Historical Highlights," n.p.). Shop B still houses the cafeteria, officers' club, and museum. It has been designated as "Building 60" at least since World War II ("Industrial Facilities Inventory"). (For further documentation see HAER No. IL-20.)

Prepared by: Jeffrey A. Hess
 MacDonald and Mack Partnership
 February 1985

PART II. ARCHITECTURAL INFORMATION

A. General Statement:

1. Architectural character: The building is a massive, late Greek Revival style, U-plan, limestone structure. It is two-and-one-half stories above a basement, with a gabled roof sheltering an attic. It forms part of a symmetrical set of five buildings along the north side of Rodman Avenue, which is mirrored by a matching set on the south side.
2. Condition of fabric: The building is well-maintained and is in good condition.

B. Description of Exterior:

1. Overall dimensions: The main (south) block (HAER Photo No. IL-20A-1) of the building measures 210' x 60' (19 bays on the south elevation and 9 bays on the north elevation). Two wings (HAER Photo No. IL-20A-2), each measuring 240' (28 bays on their exterior elevations and 22 bays on their courtyard elevations x 60' (5 bays on their north elevations) stretch north from the east and west ends of the main block. Near each end of the outer, long elevations of

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the wings are projecting pavilions measuring 60' (5 bays) and extending 15' (1 bay) from the wing elevations. The building is two-and-one-half stories tall with a full basement and attic.

2. Foundations: Coursed, rock-faced ashlar limestone measuring 3'-0" thick below a dressed ashlar limestone water table. In the south face of the southwest corner stone of the water table is the inscription, in block lettering, "BEGUN 1867" "FINISHED 1871".
3. Walls: Coursed, rock-faced ashlar limestone (HAER Photo Nos. IL-20A-1, IL-20A-2, IL-20A-3, and IL-20A-4) decreasing in thickness by 6" with each story. Colossal rock-faced ashlar limestone pilasters (HAER Photo Nos. IL-20A-1, IL-20A-2, IL-20A-3, and IL-20A-4) rising from the water table to the entablature divide the elevations into a regular bay system. The dressed limestone entablature (HAER Photo No. IL-20A-1, IL-20A-2, and IL-20A-3) carries a projecting cornice (originally dressed limestone) of tan fiber-glass simulating limestone. The pedimented gable ends (HAER Photo Nos. IL-20A-1 and IL-20A-2) are rock-faced ashlar limestone with dressed limestone cornices. There is a carved limestone block (HAER Photo No. IL-20A-3) above the central entrance of the front (south) facade bearing the date 1867.
4. Structural systems: Limestone bearing wall. Coursed, rock-faced limestone piers 20' on-center in the basement support rivetted, built-up, cast-iron, "Phoenix" columns (HAER Photo No. IL-20A-5) on the first and second floors. First, second, and attic floor systems are wrought-iron stringers and joists with brick vaulting between. The roof system is iron Fink trusses.
5. Porches: Porches (HAER Photo Nos. IL-20A-1, IL-20A-2, IL-20A-3, and IL-20A-4) are located at the center bays of the pavilions (except abutting Building 61), the north ends of the wings, the third bays from each end of the south elevation of the main block, and the center of the main block. Typical porches consist of poured concrete steps on rock-faced ashlar limestone base walls. The porch at the northwest pavilion (HAER Photo No. IL-20A-2) has a large, arched red canvas canopy on an aluminum frame extending from the sidewalk to the doorway of the Officers' Club.
6. Light Wells: Across the south elevation there is a narrow window well (HAER Photo Nos. IL-20A-1, IL-20A-3, and IL-20A-4) with rock-faced ashlar limestone walls to grade and a black steel pipe railing above grade.
7. Chimneys: There is a round, sheet-metal flue (HAER Photo No. IL-20A-1) emanating from the former upper sash of the first-floor window in the fifth bay from the west of the south elevation. It rises along the elevation to above the eaves.

8. Openings:

- a. Doorways: Principal doorways (HAER Photo Nos. IL-20A-1, IL-20A-2, and IL-20A-4) are centered in the northeast, northwest, and southwest pavilions, the wing ends, and the third bays from each end of the south elevation. Each has a rock-faced limestone segmental-arched head with a rock-faced keystone, and rock-faced limestone jambs with large semi-circular base blocks projecting into the doorway. Most of the original limestone sill blocks have been replaced with poured concrete sills. The south doorways contain sets of three three-light over single panel wood doors with transoms. The northeast pavilion has a pair of these doors with transom and sidelights. The two west pavilions and the north end of the east wing have pairs of modern glass doors with transoms and sidelights with raw aluminum framing. The north end of the west wing has a pair of modern slab doors with transoms and sidelights. Narrower doorways (HAER Photo Nos. IL-20A-1 and IL-20A-3) are located in the center of the south elevation of the main block and in the north basement elevation of the northeast and northwest pavilions. These openings are identical to those of the principal doorways, differing only in width. The center doorway of the south elevation contains a pair of four-light over three panel wood doors with transom. The northwest basement pavilion doorway contains a pair of modern glass doors in a raw aluminum frame. The northeast basement pavilion doorway contains a pair of modern glass doors in a black anodized aluminum frame. The eight original doorways of the courtyard have been obliterated by Building 75. In the basement, the southernmost bay of the east wing elevation, originally a window opening, now contains a four-panel wood door. At the north end of the same elevation is another basement window opening now containing a modern slab door. At the south end of the southwest pavilion face is a basement window opening now containing a two-light over single panel wood door.
- b. Windows: Typical first- and second-floor window openings (HAER Photo Nos. IL-20A-1, IL-20A-2, and IL-20A-3) contain six-over-six, double-hung wood sash, and have rock-faced limestone jambs, cut limestone sills and flat lintels. Paired window openings (HAER Photo Nos. IL-20A-1 and IL-20A-2) above the primary doorways have segmental-arched, rock-faced limestone voussoirs and keystones. Above the narrow, center doorways on the south and north main block elevations are similar window openings (HAER Photo Nos. IL-20A-1 and IL-20A-3) containing pairs of four-over-four, double-hung, wood sash. Attic window openings (HAER Photo Nos. IL-20A-1, IL-20A-2, and IL-20A-3) contain small, single-light, wood casement sash and are typically arranged in pairs of small openings in the building en-

tablature with sets of four centered in the gable ends and sets of three in the centers of the south and north main block elevations. These window openings have rock-faced limestone jambs and sills and lintels formed by the entablature and frieze. The gable ends contain paired window openings (HAER Photo Nos. IL-20A-1 and IL-20A-2) with rock-faced limestone jambs, segmental-arched, rock-faced limestone arches and keystones and dressed limestone sills. The basement window openings (HAER Photo No. IL-20A-2) originally contained three-over-three, double-hung, wood sash in rock-faced limestone jambs, lintels formed by the water table, and flat dressed limestone sill blocks. A few of the original basement sash survive. All window openings at the basement and first-floor levels facing the courtyard have been filled with concrete block unless used for doorways to the Building 75 in the courtyard. Many of the remaining basement windows have been filled with concrete block or glass block. Surviving wood sash are painted white.

9. Roof:

- a. Shape, covering: The roof (HAER Photo Nos. IL-20A-1, IL-20A-2, and IL-20A-3) is a cross-gable form covered with standing seam metal roofing.
- b. Cornice, eaves: The cornice and eaves (HAER Photo Nos. IL-20A-1, IL-20A-2, and IL-20A-3) are fiberglass painted tan to simulate the original limestone cornice and eaves. The interior metal gutter system is tied to exterior metal leaders which lead to an underground drainage system.
- c. Ventilators: A set of ten round, sheet metal ventilators (HAER Photo Nos. IL-20A-1 and IL-20A-2) is spaced at regular intervals along the ridges of the roof.

10. Ancillary structures: Building 75, the Kitchen, (HAER Photo No. IL-20A-2) fills the courtyard. It is a one-story, flat-roofed structure without a basement level. It has concrete foundations, exposed on the north elevation with a painted concrete block wall. Irregularly spaced on the wall are three overhead doors in masonry openings, one six-light over two panel wood pedestrian door, and three masonry window openings, two of which contain pairs of three-over-three, double-hung wood sash and the third of which contains a single sash of the same type.

C. Description of Interior:

1. Floor plans: The building originally contained no interior partitions in keeping with its function as a shop. Partitions were

added when it was converted to its present uses after World War I. A modernized freight elevator survives at the intersection of the east wing with the main block. Modern restrooms are typically located in the pavilions of the basement, first, and second floors.

- a. Basement: The basement has an open plan with a number of enclosed rooms, including storage rooms, a pistol range, a non-commissioned officers' club, a barber shop, and a technical library. The barber shop and library share a separate exterior access and limited interior access from the remainder of the basement.
 - b. First floor: The first floor is a sequence of non-related spaces and rooms tied to a general theme of food service. It contains the officers' club (two dining rooms and a bar), two cafeteria lines, and two large dining rooms. In the east wing is a museum (HAER Photo No. IL-20A-5) with its own exterior access and no interior access.
 - c. Second floor: The second floor has a center-hall plan flanked by enclosed offices and by classrooms in the east wing.
 - d. Attic: The attic is an open plan area with some open-plan offices in the south portion.
2. Stairways: There are four U-plan stairways with intermediate landings rising from the basement to the attic. These are located in each of the pavilions. Originally open, they are now enclosed. They are cast iron in curvilinear Italianate style forms with open risers and open, decorative railing supports and no newel posts. The landings and treads are covered with a modern gray rubber tile flooring. The handrails are dark varnished wood and have iron pipe railings added above them in an effort to meet modern safety standards. The bottom flights of stairs in the basement are limestone blocks.
 3. Flooring: Basement flooring is poured concrete with a sealer applied to it. It is covered with carpeting in the noncommissioned officers' club and with linoleum tile in the technical library and barber shop. The first story has poured concrete flooring covered with carpeting and linoleum tile (HAER Photo No. IL-20A-5). The second story has wood flooring covered with carpeting and linoleum tile.

The attic has wood flooring with a clear varnish finish.

4. Wall and ceiling finishes: Outer basement walls and interior piers are painted rock-faced ashlar limestone. Interior partition walls

are painted plaster, concrete block masonry at the pistol range, and modern plywood panelling in the noncommissioned officers' club. The ceiling is the exposed and painted iron joists and stringers and brick vaulting except in the library, barber shop, and NCO club which have acoustical tile ceilings.

Outer first-floor walls are painted rock-faced limestone. Interior partitions include modern plywood panelling, glazed tile, painted gypsum board, and painted plaster. Columns are encased with the same panelling, glazed tile, and painted gypsum board, except in the museum (HAER Photo No. IL-20A-5) where they are exposed and painted. The ceiling is suspended acoustical tile, except in the museum (HAER Photo No. IL-20A-5) where it is painted plaster over the brick vaulting and iron joists.

The second-floor outer walls are painted rock-faced ashlar limestone. The offices and classrooms are enclosed with painted gypsum board partitions. The ceiling is suspended acoustical tile.

The outer attic walls are painted rock-faced ashlar limestone. Interior partition walls are painted gypsum board primarily at the stairways and demountable office partitions. The ceiling is painted board decking on wood rafters and purlins.

5. Openings:

- a. Doorways and doors: Because the interior was originally an open shop there were no original doorways. Thus, all doorways are of relatively recent vintage appropriate to their respective partitions.
- b. Windows: There are no window casings. Window openings are formed by the adjacent limestone.

6. Hardware: No known original hardware, other than window sash cords, pulleys, weights, and ornate lifts, is known to survive.

7. Mechanical equipment:

- a. Heating, air conditioning, ventilation: The building is heated by steam radiators from a central heating plant (Building 227). There is no air conditioning. Ventilation is provided by numerous wall and column-mounted electric fans.
- b. Lighting: Artificial illumination is by means of incandescent electrical fixtures (HAER Photo No. IL-20A-5) in the public areas of the first floor and basement and fluorescent fixtures in the basement, second floor, and attic. No evidence remains of original artificial lighting systems.

- c. Plumbing: No original plumbing fixtures survive.
- d. Elevators: Of the two original freight elevators, only one survives, and that in a much-altered form.

D. Site:

- 1. General setting and orientation: The building anchors the northwest corner of the set of ten stone shops. It is set on the northeast corner of Rodman Avenue, the arsenal's principal street and Gillespie Avenue. East of the building is Building 62, an administration building. Connecting the two buildings is Building 61, a credit union. To the north is a paved parking lot. Located in the interior courtyard is Building 75 which houses the kitchen complex for the building. North of the building runs North Avenue. The relatively level site slopes gently to the north.

Prepared by: David Arbogast
Architectural Conservator
February 1985

PART III. SOURCES OF INFORMATION

A. Original Architectural Drawings:

No original architectural drawings of the original construction or of major alterations have been located. But a schematic drawing of the building's original configuration was published in 1877 (Flagler, Figure 1, inset on Plate I).

B. Early Views:

The picture collection of the Rock Island Arsenal Historical Office has a photograph showing the building in the final stages of construction. It is captioned on the back, "From stereo card / Shop B Building 60 / looking N by NE / CA. 1870" (see HAER Photo No. IL-20A-6). The same collection also has an undated postcard photograph that documents the completed construction. It is captioned on the front, "Part of the Shop Buildings", and on the back, "1910?" (see HAER Photo No. IL-20A-7). Another photograph in the Historical Office shows small arms production equipment installed in the building in 1904. It is captioned on the front, "156-527 July 4, 1904 / Machines for the fabrication of the service rifle"; on the back, "First floor west wing, Bldg 60 Shop B/ Rifling machines made by Pratt & Whitney" (see HAER Photo No. IL-20A-8).

C. Bibliography:

1. Primary and unpublished sources:

Baylies, Libby and Bahr, Betsy. "Historic American Buildings Survey of the United States Materials and Mechanics Research Center, Watertown, Massachusetts." 1982. HAER No. MA-20, HABS/HAER Collection, Prints and Photographs Division, Library of Congress. Discusses Rodman's architectural work at Watertown Arsenal.

"General Course of Instruction for Officers Assigned to Rock Island Arsenal." 1918. Rock Island Arsenal Historical Office. Provides detailed description of small arms machining operation during World War I (see "Supplemental Material" section of this report).

Hess, Jeffrey A., and Mack, Robert C. "Historic Properties Report Rock Island Arsenal, Rock Island, Illinois". Prepared by MacDonald and Mack Partnership, and Building Technology Incorporated for the Historic American Buildings Survey/Historic American Engineering Record, National Park Service, U.S. Department of the Interior, 1985. The report, with accompanying inventory cards, is filed as field records in the Prints and Photographs Division, Library of Congress, under HAER No. IL-20.

"Historical Highlights of Arsenal Island, 1816 - 1933." N.d. Rock Island Arsenal Historical Office. Furnishes background information on John M. Browning Memorial Museum.

"Industrial Facilities Inventory, Rock Island Arsenal." Prepared by U.S. Army Corps of Engineers, Rock Island District, 1946. Rock Island Arsenal Engineering Plans and Services Division. Lists building as "Building 60."

Real Property Cards, Engineering Plans and Services Division, Rock Island Arsenal. Briefly describes building's structural characteristics and provides sketchy history of maintenance operations.

"Real Property Inventory, Rock Island Arsenal," computer printout, March 31, 1982. Rock Island Arsenal Engineering Plans and Services Division. Gives construction for Building 107.

Slattery, Thomas J. "History of Building 360, RIA Headquarters 1899-1922." N.d. Rock Island Arsenal Historical

Office. Briefly mentions that Shop B served as arsenal headquarters from 1872-1889.

2. Secondary and published sources:

Completion Report Covering All Construction Projects Accomplished Under Supervision of the Construction Division, U.S. Army at Rock Island Arsenal. Rock Island Arsenal, 1919. Rock Island Arsenal Historical Office. Discusses planning and construction of connecting building between Shops B and D.

Flagler, D[aniel] W[ebster]. A History of the Rock Island Arsenal from Its Establishment in 1863 to December 1876. Washington, D.C.: Government Printing Office, 1877. The most detailed account of the building's construction, written by the arsenal's commandant from 1871 to 1886.

Nothstein, Ira O. and Stephens, Clifford W. A History of Rock Island Arsenal from Earliest Times to 1954. Rock Island: U.S. Army, Rock Island Arsenal, 1965. 3 vols. Rock Island Arsenal. The best account of the arsenal's general operations, with specific references to Shop B's manufacturing functions.

Stanley, F. A. "The United States Arsenal at Rock Island, -- IV, V, VI." American Machinist (February 23, March 2, March 9, 1905), 239-242; 286-288, 311-313. Detailed discussion of small arms production operation.

Stephens, Clifford W. A Synopsis of Events on Rock Island from 1954 Through 1965. Rock Island Arsenal, 1965. Rock Island Arsenal Historical Office. Discusses building's use as an ordnance museum.

Zabecki, David T. "Father of the Rock Island Arsenal." Field Artillery Journal, 49 (January / February, 1951), 55-56. Discusses Rodman's pioneering work in cannon and propellant design.

D. Likely Sources Not Yet Investigated:

Record Group 156 at the National Archives contains correspondence on the construction and operation of Rock Island Arsenal from 1871 to 1903. This material is also available on 216 reels of microfilm at the Browning Museum, Rock Island Arsenal.

E. Supplemental Material

From "General Course of Instruction for Officers Assigned to Rock Island Arsenal," 1918, pp. 26, Rock Island Arsenal Historical Office.

"The Barrel Department is in the west wing of building 'B' on the first floor. . . . The barrels are received here from the Forge Shop [see HAER No. IL-20C], counted, and 'outside straightened' by hand. The muzzle end is then faced off in a special turret machine, and the butt end milled off in a milling machine, the burrs being knocked off with a hand file. The barrels are then centered on a small drill press. This centering is done, so that they may be set up in a lathe and 'turned.' This lathe turns off about two inches on the butt end so that the barrel will fit the bushings of the barrel-boring machine. The barrels are also turned off on the muzzle end for about two inches, which leaves a size for the 'Spline.' [They] are then turned on an engine lathe for the first time, a roughing-cut being taken off the entire barrel, except the butt and muzzle ends which previously have been turned.

"From here the barrels go to the Horizontal Boring Machines, which are located along the west wall of the building. In these machines the barrel revolves at a high rate of speed and the boring is done in one cut. . . . It takes about forty minutes to bore a barrel. The barrels are then put through the Reaming Machines which also are located along the west wall. . . . The barrel is held stationary, while the reamer revolves. It takes about four minutes to ream a barrel. Each barrel is reamed three times. Then the barrels are put into lathes and cut off at the muzzle end to the proper length, which is tested in a gauge. The barrels are then turned for the second time before going to the grinding machines. The cut is made to gauge leaving twenty-thousandths for the grinding.

"The next operation is the first 'Chambering.' This is followed by the turning of the muzzle to gauge, which is done on an engine lathe. . . . The next operation is the milling of the Spline on the muzzle end of the barrel. This operation is done to form a "Sight Stud." The barrels then go to the extreme north end of the room, where the rough-straightening is done by hand and also by "Straightening Machines." This last operation lines up the bore, before the rifles go into the grinding machines, where from fifteen totwenty-thousandths of metal is ground off. Carborundum wheels are used in the grinding machines. During the grinding the barrels are kept in a bath of sodawater. . . .

"The next operation is the end milling of the Spline, and then the surplus stock around the Spline is ground off to gauge. . . . Then the barrels are stamped near the muzzle end with 'R.I.A.,' a shell and

flame, date of manufacture and a steel mark, as for example 'C103.' The 'C' in front of the number shows that Crucible Steel Company of America supplied the steel. If another steel company has furnished the steel, another appropriate letter is used. The barrel is again 'Reamed,' this time to take out the 'crimp' caused by the stamping. The barrels are 'reamed' three times at different stages in the process of manufacture.

"The second 'Chambering' is now done and consists of a tapering cut made in the butt end of the barrel bore. The next operation is the cutting of the 'Tenon' on the exterior of the butt, followed by the final grinding of the butt on a 'Grinding Machine.' The next operation is the 'Freeing Cut,' which is done on a 'Chambering Machine.' This 'Freeing Cut' forms a lee-way for the cartridge. The 'Chambering Machines' are located on the east side of the main aisle at about the center of the building. The tenon on the butt end of the barrel is now 'Threaded' so that it may be screwed into the 'Receiver.' This threading is done on a 'Chase Threader'

"The final straightening of the barrel now takes place. This operation is done in the extreme north end of the floor and is done both by hand and in 'Straightening Machines' The barrels are now ready for the third or final 'Reaming.' This cut takes off two one-thousandths of an inch, making the size of the bore three-tenths of an inch. The next operation is the 'Rifling' of the barrel. . . . The 'Rifling Machines' . . . are of the same design as those used for the last thirty years [see HABS Photo No. IL-20A-8]. In these machines the barrel revolves. There are four grooves made by the 'Rifling Machine.' These grooves are four one-thousandths of an inch deep. The barrel makes one turn in each ten inches, thus making about two and one-eighth complete turns. It takes about thirty-five to forty minutes to 'Rifle' a barrel. Another name for this machine is the 'Scrap Cutter.' These machines are located along the west wall of this floor.

"Now comes the third and final 'Chambering' which is done to gauge on a 'Chambering Machine.' The machines are located along the east wall. This operation 'Chambers' the butt end of the barrel, so that it fits the cartridge exactly. The next operation is the cut for the 'Extractor' which is done on a 'Profiling Machine' These machines . . . are located along the east wall. The barrel is now put into a lathe where the muzzle is 'Rounded' off. The next operation is the assembling of the 'Front Sight Stud' The groove in the stud fits on the Spline. The stud is driven onto the barrel and pinned. The rear plate is next assembled and slid over the muzzle of the barrel and pinned on to the butt end After polishing off the pins of both the front and rear sights, the barrel

is ready for 'Browning.' The manufacture of the barrel is now complete

"The room in which the 'Receivers' are made is located on the first floor, east wing, of building 'B'. There are eighty-two operations in the machining of a receiver, and therefore, it will be impracticable to go into the details The total time spent in machining one Receiver amounts to about six days. Directly above the 'Receiver Room' is located the 'Bolt Room' where the Bolts are made. There are forty-seven operations in the machining of a bolt. These operations are principally done on the following machines: Milling Machines, located on the west side of the room; Drilling Machines, located also on the west side of the room; Profilers and Threading Machines, located on the east side of the room. The manufacture of the bolts begins in the extreme north end of the room and the operations are done alternately on one side of the building and the other Following the last operation in this room the bolts are taken to the Filing Room where they are filed. From there they go to building 'F'. . . .

"The 'Guard Room' is located directly over the 'Barrel Room' in building B. Here the 'Guards' are manufactured. There are thirty-four machine and seven burring operations on a guard. . . . The machining of the guards begin[s] at the extreme north end of the room and the operations are done alternately on one side of the room and the other as in the case of the bolt. The machines used in this room are: Milling Machines, Drilling Machines, Profilers, and Slotting Machines. The Milling Machines are located in the northeast corner of the room and the Profilers on the northwest side. Drilling Machines are located on the center of the room on both sides of the aisle near the north end. . . . From here the guards go to the filing room."

PART IV. PROJECT INFORMATION

This project was part of a program initiated through a memorandum of agreement between the National Park Service and the U.S. Department of the Army. Stanley J. Fried, Chief, Real Estate Branch of Headquarters DARCOM, and Dr. Robert J. Kapsch, Chief of the Historic American Buildings Survey/Historic American Engineering Record, were program directors. Sally Kress Tompkins of HABS/HAER was program manager, and Robie S. Lange of HABS/HAER was project manager. Building Technology Incorporated, Silver Spring, Maryland, under the direction of William A. Brenner, acted as primary contractor, and MacDonald and Mack Partnership, Minneapolis, was a major subcontractor. The project included a survey of historic properties at Rock Island Arsenal, as well as preparation of an historic properties report and HABS/HAER documentation for 38 buildings. The survey, report, and documentation were completed by Jeffrey

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A. Hess, historian, Minneapolis; Barbara E. Hightower, historian, Minneapolis; David Arbogast, architectural historian, Iowa City, Iowa; and Robert C. Mack, architect, Minneapolis. The photographs were taken by Robert A. Ryan, J Ceronie, and Bruce A. Harms of Dennett, Muessig, Ryan, and Associates, Ltd., Iowa City, Iowa. Drawings were produced by John Palmer Low, Minneapolis.